

Fatal fat embolism after above knee amputation in a child

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Abstract

We report a fatal pulmonary fat embolism syndrome arising consequent to an above knee amputation in a child. Pre-existing poor respiratory reserves, as a result of severe scoliosis, may have contributed to the fatal outcome.

Introduction

A 10-year-old boy with post-meningococcal septicaemia multi-level amputations underwent conversion of a below knee amputation to an above knee amputation following gross fibula overgrowth (Figure 1). Co-morbidities included severe cerebral palsy, epilepsy, gastro-oesophageal reflux requiring PEG feeding, severe scoliosis and previous Chiari osteotomy with femoral derotation varus osteotomy for developmental dysplasia of the hip. The above knee amputation surgery was uneventful. On the third post-operative day, he developed acute severe respiratory distress with clinical signs of left lower lobe consolidation. His initial supportive management on a Paediatric HDU was based on a presumptive diagnosis of a further aspiration pneumonia complicating a background respiratory dysfunction arising from his scoliosis. Despite full supportive measure including ventilation on ITU, he died 7 days after surgery. A dedicated paediatric pathologist at the regional paediatric centre performed the post-mortem examination, which revealed unequivocal evidence of pulmonary fat embolism with no sign of aspiration of gastro-intestinal contents.

Discussion

Fat embolism syndrome (FES) after trauma or intra-medullary instrumentation of the femur is a well-recognised entity, with diagnostic criteria defined by Gurd in the 1970s.^{1,2} It typically occurs one to three days following injury or surgery and with early diagnosis and appropriate cardio-respiratory support, the mortality rate varies between 5 and 15%, rising to 36% in patients requiring ventilation.³

The presumed mechanism: increased

intramedullary pressure forcing debris into the venous circulation may be an over-simplification however. FES has been demonstrated without a mechanical stimulus, for example in burns and pancreatitis patients and in approximately 50% of unselected patients at autopsy, fat can be seen precipitated in the pulmonary vasculature. Nevertheless fat emboli (FE) do undoubtedly occur during orthopaedic procedures as a result of raised intramedullary pressure. Using transoesophageal echocardiography, emboli consisting of bone debris and fat are readily demonstrated within the right atrium during surgery and the severity of symptoms has also been correlated with the embolic load.^{4,5} There are no previous reports of FES occurring after above knee amputation on the Medline Database. It is difficult to comprehend that a minimally traumatic transverse division of the distal femur at the diaphyseal-metaphyseal junction could result in an embolic load sufficient to cause an acute respiratory collapse. In a patient with poor respiratory reserve secondary to a marked scoliosis (Figure 2), that had precipitated previous

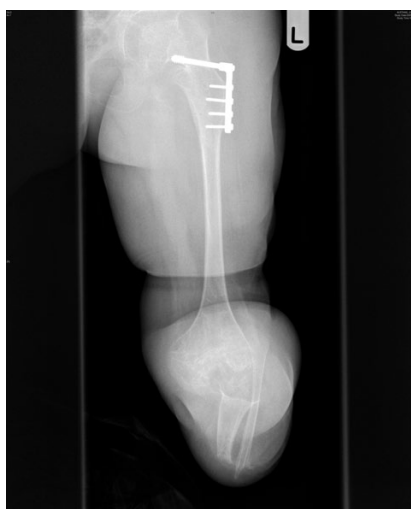


Figure 1. Fibula overgrowth.



Figure 2. Chest x-ray showing scoliosis.

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admissions with respiratory failure, this appears to have been sufficient to precipitate a fatal FES. The patient had undergone numerous major orthopaedic procedures in the past with no post-operative complications.

Conclusions

Fat embolism can occur after any traumatic event affecting the femur. In patients with a poor respiratory reserve, the trauma associated with a simple transverse division of the femoral shaft may be sufficient to precipitate acute respiratory failure.

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